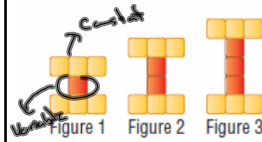


4.1

Writing Equations to Describe Patterns

LESSON 1

Connect



What stays the same in each figure?

yellow 6

What changes in each figure?

of Red blocks

How can we determine the number of square tiles in any figure in the pattern?

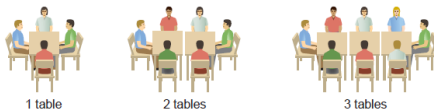
$$t = f + 6$$

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A banquet hall has small square tables that seat 1 person on each side. The tables can be pushed together to form longer tables.



1) Sketch the next 2 table arrangements in the pattern.



Connect



2) What stays the same in each arrangement.

2 people at the end. -> constant

3) What changes in each arrangement.

2 people per table added.

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Connect

1 table 2 tables 3 tables

4) What different strategies can you use to determine the number of people at 6 tables?

$$P = 2t + 2$$

$$P = 2(6) + 2$$

$$= 12 + 2$$

$$P = 14$$

5) 10 tables?

$$P = 2(10) + 2$$

$$P = 20 + 2$$

$$P = 22$$

6) 25 tables?

$$P = 2(25) + 2$$

$$= 50 + 2$$

$$P = 52$$

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A landscape designer uses wooden boards as edging for the plots in a herb garden.

1 plot 2 plots 3 plots 4 plots

4 7 10 13

The number of boards, b , is related to the number of plots, p . The relationship can be represented in different ways:

- 1) using pictures
- 2) using a table of values
- 3) using an equation

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Here is two ways to determine the equation.

Number of Plots, p	Number of Boards, b
1	4
2	7
3	10
4	13

constant.

$+1$ $+3$

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Here is two ways to determine the equation.

1 plot 2 plots 3 plots 4 plots

$b = 3p + 1$

# of Plots, P	Pattern in the # of boards	Number of Boards, b
1	$3(1) + 1$	4
2	$3(2) + 1$	7
3	$3(3) + 1$	10
4	$3(4) + 1$	13
5	$3(5) + 1$	16
P	$3(P) + 1$	$3P + 1$

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EXAMPLE 1:

An airplane is cruising at a height of 10 000 m. It descends to land. This table shows the height of the plane every minute after it began its descent. The height of the plane changes at a constant rate.

Time (t minutes)	Height (h metres)
0	10 000
1	9 700
2	9 400
3	9 100
4	8 800

a) Write an expression for the height in terms of the time since the plane began its descent.

$$-300t + 10000$$

Connect

EXAMPLE 1:

An airplane is cruising at a height of 10 00 m. It descends to land. This table shows the height of the plane every minute after it began its descent. The height of the plane changes at a constant rate.

Time (t minutes)	Height (h metres)
1	10 000
2	9 700
3	9 400
4	9 100
5	8 800

b) Write an equation that relates the height of the plane to the time since it began its descent.

$$h = -300t + 10000$$

or $h = 10000 - 300t$

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Jan 21-8:55 AM

Connect

EXAMPLE 1:

An airplane is cruising at a height of 10 00 m. It descends to land. This table shows the height of the plane every minute after it began its descent. The height of the plane changes at a constant rate.

Time (t minutes)	Height (h metres)
1	10 000
2	9 700
3	9 400
4	9 100
5	8 800

c) What is the height of the plane after 15 minutes?

$$h = -300t + 10000$$

$$h = -300(15) + 10000$$

$$h = -4500 + 10000$$

$$h = 5500$$

d) How long after beginning its descent does the plane land?

$$h = -300t + 10000$$

$$0 = -300t + 10000$$

$$300t = 10000$$

$$\frac{300t}{300} = \frac{10000}{300}$$

$$t = 33.\bar{3}$$

Connect

EXAMPLE 2:

The cost of taking a ride in Kelly's Cab is shown on the poster.



a) Write an expression for the fare in terms of the fixed cost and the cost per kilometre?

$$1.5x + 3.60$$

b) Write an equation that relates the fare to the distance travelled.

$$C = 1.5x + 3.60$$

$$C = 1.5(11) + 3.60$$

$$= 16.50 + 3.60$$

$$C = \$20.10$$

c) What is the fare for an 11 km ride?

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Discuss the ideas

1) What different ways can you represent a relationship between two quantities?

Picture
table of values
Equation

2) Suppose you have determined an equation that you think may describe a pattern.

a) How could you check that your equation is correct?

b) If you need to adjust the equation, how can you determine what needs to be changed?

→ use examples
→ substitute
Variable
Constant.

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Practice

CLASSWORK

Page 159 - # 7, 8, 9, 10

Jan 21-8:55 AM